

## *Introduction*

### *Development of a Generic Work Control Matrix*

*To be applied to all planning efforts across Y-12 and ETTP (including operational work, maintenance work, surveillance and maintenance of safety significant systems and construction/subcontracted work), this matrix, developed by EWP teams, provides important guidance for determining the level of planning and work control based on a job's hazard and complexity.*

*While the implementing mechanisms for the Work Control Matrix concepts will be slightly different for the various LMES organizations involved (e.g., EUO; Disassembly and Assembly; Quality Evaluation; Receipt, Storage and Shipment; EMEF) each organization's enhanced hazard assessment/work control system will be consistent within the generic approach identified in the Matrix and its supporting rationale. Fundamentally, this EWP work product calls for:*

- o clarification of roles and responsibilities of work requestors and authorizers such that better insight into possible job or facility hazards are provided at the very start of the work identification/authorization process;*
- o implementation of formalized and consistent hazard analyses and job requirement identification tools;*
- o adoption of the matrix to provide better guidance to the planners and others as to the necessary level of planning and work control for given jobs;*
- o clearer criteria for rejection and return of a work package/task by a downstream organization involved in the work control process if it is found that the upstream organization has not adequately performed its duties (i.e., the information provided is unclear, inaccurate, inadequately documented, etc.).*
- o implementation of a multi disciplinary planning coordination center meeting for jobs and tasks meeting certain hazard/complexity rankings;*
- o better use of planning walkdowns and pre-job briefings tailored in formality and content based on a job's hazard and complexity;*

*The Work Control Matrix will be piloted by the ETTP Safe Work Planning Group, a committee established to implement corrective actions identified as a result of the recent fatality as well as to ensure immediate improvement in planning and hazard analysis associated with all work logged onto the site's Daily Activities List. The Matrix is being incorporated into the LMES Safe Work Controls procedure which will serve as command media for all work at LMES Enriched Uranium Operations (EUO) and Enrichment Facilities (EF) at Y-12, ETTP, Portsmouth, and Paducah.*

## MEMORANDUM

TO:           Ward Marsh           Ray Smith  
              Roy Stallions       Lou Tanner

From:       Frank Fitzpatrick

Date:       May 19, 1997

RE:       o     Defined Criteria for Work Control Categories (Draft)  
            o     Defined Level of Planning for Work Control Categories  
            o     Suggested Path Forward for Oak Ridge EWP as it relates to ISMS and  
                  Accident Response

In response to what I believe I was asked to do, the following is intended to serve as a straw man which generically defines Work Control Categories and associated Planning Levels as they may be applied to virtually all work at Oak Ridge. I have also summarized how I believe the Oak Ridge EWP initiative fits into all this.

As the write-up reflects, the categories and planning levels attempt to incorporate, as simply as possible, the majority of applicable concepts found in the EWP, ISMS, and Accident Response documents I have been provided. I'm sure these ideas would benefit considerably from an in-depth review by principals of these complimentary efforts.

Note that I have incorporated preliminary comments of most members of the EWP Work Control Teams at ETTP and Y-12. While complete consensus has not been reached, I believe that the majority of the Team members agree with the concepts presented. Overall, I believe what is provided is certainly not inconsistent with what the teams have come to recognize as necessary "enhancements" to the way hazard analyses are conducted and work is presently controlled. However, even within just the respective maintenance groups (no attempt has been made to discuss these matters with groups such as Operations, Surveillance, Construction) complete consensus has not been reached (and is probably impossible, even for 'generic' criteria). Ultimately, (after due discussion and refinement, of course), someone needs to make a decision that these criteria and the associated mechanisms (or something like them), will, in fact, be put in place. I hope this write-up can serve as a starting point for discussions which can lead to these decisions.

Of course, assuming the decision is made to pursue developing the concepts presented herein, much more needs to be done through review and comment cycles, developing implementation plans, providing specific examples to assist in interpretations, etc. I look forward to supporting these efforts.

## *Oak Ridge Enhanced Work Planning*

# **Generic Criteria for Work Planning Categories**

### **Background**

The Oak Ridge Integrated Safety Management System (ISMS) has adopted a variety of guiding principles consistent with the fundamental tenets of enhanced work planning (EWP). Similarly, improvements to the hazard assessment/work control systems are being implemented per the Type A Investigation Report (stemming from a recent fatality at K-25) which are consistent with EWP tenets .

Overall, emphasis is being placed on mechanisms which better rely on the face to face interactions among line and safety disciplines as well as craft involvement in work planning. In addition, the system calls for a tailored approach to Work Planning, Hazard Analysis, and the identification and implementation of controls in the diverse facilities and operations present at Oak Ridge, based on factors such as potential for injury to worker, severity of adverse consequence, and complexity of the work activities involved. Furthermore, it has been recognized that effective implementation of these systems demands that coordinated, technically defensible hazard analyses be performed as far up-front in the planning process as possible so that any necessary controls can be seamlessly integrated and where feasible, engineered into the work-- thus maximizing safety, preparedness, efficiencies and productivities while minimizing unnecessary delays due to unanswered questions or unanticipated roadblocks.

It is intended that these concepts be instituted for virtually all hands-work at Oak Ridge including:

- o Operational work
- o Maintenance work
- o Surveillance and maintenance of safety significant systems
- o Construction (subcontracted) work

It is expected that the implementing mechanisms for these concepts will be slightly different for the various LMES organizations involved (e.g., EUO; Disassembly and Assembly; Quality Evaluation; Receipt, Storage and Shipment; EMEF). However, even though tailored to specific groups, each organization's enhanced hazard assessment/work control system will be consistent within the generic approach outlined below.

The Oak Ridge Enhanced Work Planning (EWP) Program is being used as a means to help integrate these principles into the work control system and implement them at the very basic 'job task' or 'work package' level. As described below, certain enhancements are being made at this level to support work identification, work evaluation, job planning and work package assembly, pre-job instruction, and feedback. Fundamentally, these enhancements include:

- o clarification of roles and responsibilities of work requestors and authorizers such that better insight into possible job or facility hazards are provided at the very start of the work identification/authorization process;
- o implementation of formalized and consistent hazard analyses and job requirement identification tools;
- o adoption of a matrix to provide better guidance to the planners and others as to the necessary level of planning and work control for given jobs;
- o clearer criteria for rejection and return of a work package/task by a ‘down stream’ organization involved in the work control process if it is found that the “up stream” organization has not adequately performed its duties (i.e., the information provided is unclear, inaccurate, inadequately documented, etc.).
- o implementation of a multi disciplinary “planning coordination center” (PCC) meeting for jobs and tasks meeting certain hazard/complexity rankings [similar in concept to an Facility Operations Safety Board (FOSB)];
- o better use of planning walkdowns and pre-job briefings tailored in formality and content based on a job’s hazard and complexity;

Additional information about these concepts and how they apply to the Oak Ridge work control system is found below.

### **Fundamental Criteria for Work Control Categories**

The following matrix identifies fundamental criteria which can be generically used to help define the level of rigor to be associated with planning and work control for a given job or task. It is the planner’s responsibility to initially evaluate the work’s hazard and complexity (relying on support personnel and automated tools, as necessary), as well as to ensure the logic in the Matrix is properly applied.

# WORKER HAZARD/JOB COMPLEXITY MATRIX (DRAFT)

Work Control Level	Hazard	Complexity	Plan Formality	Supervisor Involvement	SME Involvement in Hazard Analysis	PCC* Review (Mandatory)	Formal Pre-Planning Walkdown	Pre-Job Instruction & Safety Review
“A”	high	complex	technical procedure/ manual	maximum	required	yes	mandatory	Job Safety Review
“B”	high	simple	job plan	maximum	required	yes	decided at PCC	Job Safety Review
“C”	medium	complex	job plan	normal	decided at PCC	yes	decided at PCC	Pre-job Brief
“D”	medium	simple	job plan	normal	planner’s discretion	no	planner’s discretion	Pre-job Brief
“Minimally Planned”	low	complex	ticket/verbal w/minimal instructions	minimal	planner’s discretion	no	planner’s discretion	Pre-job Brief
“Skill of Craft”	low	simple	ticket/verbal	minimal	planner’s discretion	no	planner’s discretion	Pre-job Brief

\* “PCC”: “Planning Coordination Center”

## Working Definitions and Notes Regarding the ES&H Work Control Matrix

Hazard:	<p>A condition or set of conditions, either internal or external to a particular job, system, product, or operation, with the potential of causing harm to personnel, damage to equipment or structures, or release of potentially hazardous materials to the environment. On Matrix, the “Hazard” column is an index of both severity of adverse consequence (severity) and probability that adverse consequence will occur (risk);</p> <p><i>[Note that the Hazard/Complexity ranking can be determined largely from the planner answering various screening questions presented to him from an automated tool such as the Oak Ridge Work Planning and Permit Information System (WPPIS) or the product of Oak Ridge's tailoring of the Hanford Automated JHA. The automated tool chosen will provide defensible and documented logic. Note that the planner (with supervisor's input) must take into consideration how routine the job is when assigning the rankings-- unusual or atypical jobs would tend to get a higher ranking.]</i></p>
Low Hazard:	<p>Work requiring the attention of the average performer to prevent minor injury. Failure to correctly perform low hazard work would not damage equipment or structures or release potentially hazardous materials into the environment, except as a result of gross negligence.</p>
Medium Hazard:	<p>Work requiring the coordinated actions of one or more person(s) to prevent any injury to personnel, minor damage to equipment or structures, or release of hazardous materials to the environment.</p>
High Hazard:	<p>Work requiring the coordinated actions of one or more person(s) to prevent serious injury to personnel, significant damage to equipment or structures, or release of reportable quantities of potentially hazardous materials to the environment.</p>
Complex:	<p>Work which involves any of the following:</p> <ul style="list-style-type: none"><li>o a large number of detailed steps to be performed requiring actions or sequence which may not be obvious or otherwise tax memory and capability such that written instructions are necessary (note: written instructions are not practical for steps which must be performed rapidly in succession)</li></ul>

- o coordination of more than several people or organizations must occur to safely and properly execute the work
- o Many variables are associated with the task which must be controlled
- o Significant professional skill and/or special experience/training/skills must be involved (beyond what would be expected of the ‘minimally qualified individual’ to be assigned to the job.

Simple: Work which is not complex.

Plan Formality: Level and detail of planning and documented instruction necessary for the work at hand.

Technical Procedure/  
Manual: A detailed work instruction written per Y-10-103, writer’s Guide for Y-12 Plant Technical Procedures and administered per Y-10-102, Technical Procedure Process Control. These procedures are used for more complex tasks with other than low error consequences. Detailed instructions as found in technical equipment manuals may be incorporated in the work instruction.

Job Plan: A Job Plan does not require the rigor and formality of control as a Technical Procedure but never-the-less provides documented written instructions. Job plans can include, or incorporate by reference, procedures, guidelines, vendor manuals, “standardized” job packages, and aids such as approved sketches and checklists. Generally, changes to a job plan may require simply supervisor’s approval.

Ticket/Verbal “Ticket/Verbal” instructions are appropriate where minimal planning, coordination, approval and documentation is necessary. Ticket/verbal instructions rely almost exclusively on the “skill of the craft” to properly execute assigned tasks.

Supervisor  
Involvement: This column sets requirements for the minimum involvement of the supervisor of the workers performing the job.

Maximum: Supervisor must be thoroughly familiar with the assigned work, have read, understood and agreed to all work instructions, have personally visited the job site to ensure the adequacy of the work instruction and readiness to begin work, and carefully chosen the

workers involved based on personal familiarity with the job's unique requirements and the workers' individual skills, experience, and training.

Normal: Supervisor must comply with "Maximum Involvement" criteria except personal visits to the job site is not mandatory nor is personal hand picking of qualified workers.

Minimal: Supervisor must provide the level of involvement he/she sees fit based on professional experience.

#### SME Involvement in Hazard Analysis:

Refers to the whether subject matter experts in ES&H support groups (e.g., safety engineers, industrial hygienists, radcon professionals, etc.) must also be personally involved in up-front (i.e., pre-planning) analysis of job hazards, specifying controls, and permit preparation. "Personally involved" refers to a qualified representative of the support group visiting job site to conduct pre-planning assessments, coordinating with others at the PCC, preparing applicable permits (rather than solely relying on the planner), etc. Also requires appropriate SME's to assist in pre-job start activities to verify that hazards have not gone unrecognized, permit conditions are being met and controls are adequate.

#### PCC Review:

Refers to the processing of the work at hand through a "Planning Coordination Center". The PCC meeting provides an organized forum for the various groups and subject matter experts and craft to collaborate their hazard identification/control and work planning efforts. The Planner is responsible for setting up and running the meetings through which certain work packages go. The PCC is essentially a forum where a nucleus of those involved in the work control process (Safety, IH, radcon, craft/craft supervision, planners, etc.) meet to process work packages. In order to reduce the number of people in the PCC meeting, participants may assume multiple duties; e.g., a representative from 'safety' can also represent 'IH or 'engineering' might also represent 'nuclear criticality'-- providing they know what to be looking for and can always call in more knowledgeable experts later.

At the PCC:

-- Hazard analyses can be conducted in concert using



- automated or conventional means;
- Additional validation of work package occurs;
- Davis Bacon screening can occur;
- permits can be prepared/completed in a coordinated fashion (e.g., radcon can discuss PPE with IH to minimize inconsistencies);
- Formal walk down dates can be established; and
- In general, ideas are heard, awareness is built, and coordination occurs up-front in the process.

Formal Pre-Planning  
Walkdown:

Refers to a pre-planning walkdown where appropriate groups (including craft) visit the job site together to help plan and coordinate the job. While walkdowns can also occur which are ad hoc or informal, jobs which are deemed high hazard/high complexity necessitate formalized, multi disciplinary walkdowns. The planner leads the walk down and is responsible for scheduling and deciding who is required to come.

Pre-Job Instruction:

Refers to the instructions and briefings given to the work force just before work is to begin.

Job Safety Review:

JSR's usually occur at the job site and are lead by the supervisor. They require the mandatory participation of key people/disciplines as determined by the planner and supervisor. JSR's are conducted to meet the objectives and per methodology established by Procedure [to be developed] .

Pre-Job Brief:

Pre-job briefs may be held at the job site or other suitable location. They are less formal than JSRs and follow Procedure [to be developed] .

## ADDITIONAL NOTES FOR DISCUSSION

The following is provided to stimulate discussion and help clarify what specific actions are needed to enhance the existing hazard analysis/work control systems. The Oak Ridge EWP Program is proceeding on the basis that it is desirable to enhance these systems such that the following concepts are better institutionalized.

### **Work Identification**

- o Using enhanced electronic tools\*, work requestor provides clear and accurate description of what work is needed (specific equipment identifiers, location, job boundaries, problem that needs to be solved, etc.). (\*Features of the Fernald “Automated Work Package” should be fully considered for possible tailoring).
- o Work authorizer (e.g., facility manager) validates request (e.g., reviews, clarifies, approves, gives priority justification/scheduling preferences, assigns cost codes, etc.);
- o Work authorizer checks off which “preliminary concerns” he/she believes may be present on the job; Also, any special facility- or system-specific concerns or requirements must be indicated by the authorizer. This all serves to better “define the work at hand” and gives planners a better idea of what they are dealing with. Through use electronic ‘alerts’, this will also give “down stream” groups an early indication that their participation in planning/execution may soon be necessary. (They now know early on that work is pending and can start thinking about the best approaches, past experiences start looking at the job site, etc.)
- o Planner receives this information and can “reject/return” request/package due to what appears to them to be insufficient/unclear information.

(This lends itself to a performance measure and can soon lead to better work packages. Via the EWP program, we can have all the various groups touching the work control system establish “Acceptability Criteria” for what they are handed; this can be disseminated to those being evaluated ‘upstream’ in the process. Also, metrics can be established and results of work product ‘acceptability’ can be plugged into feedback loops. (“What doesn’t get measured, doesn’t get done...”))

### **Work Evaluation**

- o Using the Work Control Matrix, the planner is responsible for giving the work identified the appropriate initial hazard and job complexity ranking; This ranking may be changed over the course of the pre-planning and planning activities as input from others is made available (e.g., after “Planning Coordination Center meeting, walkdowns, input from SME’s, etc...).

- o Initial hazard/JobComplexity ranking is determined largely from the planner answering various screening questions presented to him from an automated tool like WPPIS or the “Hanford Automated JHA”. The automated tool provides defensible and documented logic. Note that the planner (with supervisor’s input) must take into consideration how often the job is accomplished and the craftperson’s past experience in executing the job when assigning the rankings-- unusual jobs would tend to get a higher ranking.
- o Based on the initial input, the automated tool would spit out recognized hazards, the names of the required permits, the completed Matrix, etc. Also, electronic messages could be sent to those parties who should be aware that their participation might be needed soon (e.g., if ‘asbestos’ is listed as a concern, the asbestos response organization is alerted...)
- o Planner should rely on the supervisor and his craft, as well as the various ‘support group subject matter experts’ to arrive at the appropriate ranking.
- o The worker Hazard/Job Complexity ranking determines the typical rigor associated with the work control process as illustrated in the matrix. Note that not much emphasis is placed on trying to pigeon hole work into classic planned/skill of the craft, routine/non routine, etc. bins. This new system would lend itself more to a “sliding rigor”...
- o Planning is responsible for setting up and running a “planning coordination center” meeting through which certain work packages go through (see Matrix). The PCC is essentially a forum where a nucleus of those involved in the work control process (Safety, IH, radcon, craft/craft supervision, planners, etc.) meet to process work packages. Primarily, to reduce the number of people in the PCC meeting, participants may wear multiple hats; e.g., a representative from ‘safety’ can also represent ‘IH or ‘engineering’ might also represent ‘nuclear criticality’-- providing they know what to be looking for and can always call in a more knowledgeable expert later. (This may involve “cross training” of those involved in the work control process which has been proven to advance goals of S&H, productivity, etc.)

At the PCC:

- Additional validation of work package occurs;
  - Davis Bacon screening can occur
  - permits can be prepared/completed in a coordinated fashion (e.g., radcon can discuss PPE with IH to minimize inconsistencies)
  - Formal walk down dates can be established
  - In general, ideas are heard, awareness is built, and coordination occurs...
- o Planner also can coordinate more formal, multi-disciplinary ‘walk downs’ of certain jobs, if deemed appropriate. (see Matrix)

- o Planner, at his discretion (or per the Matrix), can turn over responsibilities relating to the completion of permits to the group responsible for that permit (i.e., if an asbestos permit is needed, it no longer has to be the planner who completes it and must chase down signatures, it now is the asbestos response organization...).
- o Overall, the planner coordinates the completion of the work package and those parties he calls on for support must be responsive. Folks must show up at PCC meetings and walkdowns, prepare permits on time, give input to planner when asked, etc. (this lends itself to “automated manager alerts” and other performance measure techniques). May require a “culture change” at Oak Ridge.

### **Job Planning and Work Package Assembly**

- o Overall, planner is responsible for coordinating his “team” and tracking the work through planning (assembly of package, producing planning instructions, etc., compiling certain documentation, ensuring signatures/approvals are OK, etc.);
- o Whereas the planner was responsible for doing the initial worker hazard/job complexity screening, the initial screening may require a support organization to complete a “Detailed Job Hazard Analysis”. He would work with the SME’s to translate the information from the detailed JHA to appropriate work instruction, support group coverage, etc.

### **Pre-Job Instruction**

- o Ranking (matrix) dictates whether pre-job briefing is necessary or a more rigorous “job safety review”
- o Planner and supervisor determine who should be involved, whether a work site pre-job visit is necessary, etc.

### **Feedback**

- o Formalized/automated system used to capture impressions of job’s participants about how well the various work control mechanisms worked, etc. (e.g., ‘customer surveys’ of important or illustrative aspects of planning, scheduling, hazard ID, responsiveness, etc.) ; While all groups involved in the control of work at the job/task level will use established “acceptability criteria” to improve the work control processes and overall “customer-oriented” culture, focus will be placed on helping ensure the planner receives adequate information, support and feedback from those he must coordinate to prepare an acceptable work instruction. Similarly, focus will also be placed on ensuring the planned work package is adequate in the view of the workers and craft supervisors who must execute the work.

- o Various performance measures can be assembled (on time?, within estimate? injuries/illnesses?)
- o Other lessons learned (and S&H monitoring data) can be compiled and linked directly to job package through automated means.